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THE PLANT DISEASE REPORTER

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BUREAU OF PLANT INDUSTRY

UNITED STATES DEPARTMENT OF AGRICULTURE

and Pima-Egyptian cotton was practically free from rust although it was vigorously attacked by the bacterium (Phytomonas malvaceara) [Bacterium malvacearum] of angular leafspot.

Cotton rust was first described by Brandegee (Erythea 5: 6, 1897) on leaves of cotton at San Jose del Cabo, Lower California. In 1917 Taubenhaus (Science 46: 267-269) called attention to an outbreak of the rust in southern Texas. His observation that "where irrigation and cultivation was (were) slightly neglected infection was found to be very mild" agrees with mine: rust is frequently absent or less prevalent on cotton plants growing on slightly elevated areas, which are meagerly supplied with water in irrigated fields; likewise, unthrifty and woody plants which are the result of other unfavorable environmental conditions often are slightly infected with the rust parasite or escape it. However, his suggestion that "it is therefore very probable that the waters of these rivers have carried sporidia from Mexican sources, which were now responsible for the infection of the cotton" is at variance with my observations of the rust during the past 20 years. Much of the cotton attacked by the rust fungus in Arizona is irrigated from wells, some of it through cement-lined canals. Furthermore, no rusted plants of the alternate hosts (species of Sporobolus and Muhlenbergia) have yet been found in our cotton fields, so that the irrigation water has no chance to carry the basidiospores of the rust fungus unless the spores fall into it from the air.

Since cotton rust first occurs in the moister parts of fields, such as low spots and strips along irrigation ditches, unless a shower of rain has fallen, the presence of moisture sufficient for the germination of the basidiospores would appear to be the important factor. Cold air from the higher elevations flows like water in the depressions; therefore there is more likely to be condensed water on the leaves of cotton plants growing in depressions than on cotton growing elsewhere. Much of the cotton-growing season in Arizona is dry and if rust appears before the rains, it shows in the moister parts of the field. After the rains of summer begin, any time from the first of July to the first of August, the rust "spreads" quickly. It would appear that the basidiospores arrive by air, that they are often viable, and that they germinate and produce infection of cotton only when sufficient moisture is present on the susceptible parts of the cotton plant.

In regard to the source of the basidiospores from grasses, it is interesting to note that both Sporobolus and Muhlenbergia species grow in the foothills and mountains adjacent to the Santa Cruz cotton districts in the Continental and Sahuarita areas. They are also probably present in the mountains and foothills of northern Mexico. None of the grasses reported as alternate hosts of Puccinia schedonnardi have yet been seen by the writer actually growing in rusted cotton fields. Absence or scarcity of the cotton rust in the Salt River Valley might be due to the warmer air with less condensed moisture on the cotton leaves during the season in which rust is

prevalent elsewhere; it might be due to the direction of the prevailing winds; it might also be due to the greater distance of the Valley from the source of the basidiospores.

How long the basidiospores of Puccinia schedonnardi can live in air appears to be unknown. The few basidiospores studied in this respect (Joseph C. Arthur - Plant Rusts - John Wiley & Sons New York 1929) showed a longevity of four to four and one-half hours in moist air, and only in the case of Gymnosporangium juniperi-virginianae did they live in dry air for a considerable period (less than 12 hours). In general the resistance of microorganisms to the drying effect of air appears to be greater in many instances than has been supposed. Abundant bacteria and fungi, although less numerous over the higher mountains, were cultured from the air on sterile agar plates exposed from aeroplanes between Phoenix and Tucson at elevations up to 7,200 feet above sealevel (Science 72: 322-323. 1930). The writer believes that the basidiospores of the cotton-rust fungus are carried in air currents in a living condition for at least a few miles; that they are present to a greater or less extent on the leaves of cotton plants in the southernmost cotton districts of Arizona (distribution depending upon the direction of air currents with reference to the cotton fields and the source of the basidiospores), and that the presence of moisture on the cotton leaves is the important factor affecting the extent of the rusting of cotton.

(University of Arizona).

TOBACCO DISEASES IN KENTUCKY, 1938

W. D. Valleau and E. M. Johnson

In spite of a late sowing season plant beds were unusually early. Blue mold [downy mildew, Peronospora tabacina] was present in nearly all plant beds in the State. While it appeared to cause severe injury in many affected beds, the crop was set unusually early and there was little evidence of reduction in acreage because of this disease. Infection of plant beds at setting time with Bacterium angulatum and in more localized areas with Bacterium tabacum was heavy. Usually these diseases are hardly in evidence at setting time.

Fertilizer injury was present in many beds in all parts of the State following a protracted dry period. The plants gradually turned yellow or grew very slowly and were easily detached from the soil. The original roots were of small diameter and dark colored near the ground surface. The crown was enlarged and many new root tips were pushed out from the crown but failed to develop further. Salts were frequently found crystallized on the surface of the soil. Nitrates, sulfates, and chlorides were

high; for example, one sample contained over 1600 pounds of nitrate nitrogen per 2,000,000 pounds of soil. Heavy watering was recommended and proved effective. The trouble could easily be distinguished from nitrogen starvation because in the latter the roots are exceptionally well developed.

The leaf spots caused very extensive damage to dark tobacco in western Kentucky and some loss of lower leaves in Burley tobacco all over the State. Plant bed treatment with Bordeaux mixture was effective in keeping infection out of the field until about the first of August, after which time it gradually built up in dark tobacco fields to injurious proportions. This applies to both angular leaf spot and wildfire. Wildfire was found on one Burley plant on the Station Farm on August 15 and on a few plants late in the season at the Princeton Substation. The disease is rare on both farms and was not present early in the year.

Growers and county agents report that where Bordeaux mixture was used for leaf spot control, downy mildew entered the beds a week to ten days later than in untreated beds.

During the severe outbreak of so called epidemic wildfire and blackfire in western Kentucky, water-soaked leaves were rarely found following storms but damage to the crop from these diseases was severe. The typical large concentric blackfire type of spot was frequently produced by pure culture and tissue culture inoculations with Bacterium tabacum and occasionally with B. angulatum on leaves not subjected to water soaking. Potash starvation apparently associated with the abnormally wet season was unusually prevalent all over the State and may have been one of the reasons for severe blackfire injury to dark tobacco.

Mosaic was more abundant than for several years. Tobacco was set early and grew rapidly and apparently the plants were very susceptible to field spread of mosaic. The burning strains of the virus were prevalent. In one field observed all precautions had been taken to control mosaic as far as handling cured tobacco was concerned, but there was heavy infection in parts of the field. While it was the second year for tobacco the distribution of mosaic in every second plant or in all plants in one row indicated infection at or before pulling time. Infection was traced tentatively to perennial solanaceous weeds which were abundant in the bed; some of them were infected and the virus had evidently been transmitted to an occasional tobacco plant at weeding time.

Ring spot and etch were more prevalent than usual.

Streak was fairly common. Several severe outbreaks were reported in Owen, Carroll, Gallatin and neighboring counties. One field was reported to have 80 percent of the plants affected. Although this disease appears to be identical with the streak disease described by James Johnson, we have not yet been successful in transmitting the disease from plant to

plant of tobacco by the various methods of juice inoculation. For two years many streak plants have occurred in a plot of tobacco adjacent to one of second-year sweet clover, while the disease is rare on the remainder of the Station Farm.

What appears to be an undescribed virus disease of tobacco was observed in Monroe County in a field recently cleared from forest. The White Burley plants wilted severely in the middle of the day but appeared turgid in the morning. The lower leaves yellowed rapidly. The younger leaves had small yellow dots and blotches scattered thickly over them and the leaves were frequently lop-sided. The roots of affected plants were wiry and black up to the point of insertion in the buried stem from which they had arisen. The central cylinder of affected roots was dark and the cortex was a dirty dark gray. The vascular ring of the underground stalks was nearly black, the cortex was dirty white. When the bark was removed the wood appeared very dark. Plants transferred to the greenhouse gradually recovered and appeared to grow normally with the exception that an occasional chlorotic or necrotic ring developed on a new leaf. All attempts to transmit the disease failed. Affected plants were usually in groups but scattered ones were also found. Tulip poplar seedling trees a foot or less in height growing in the woods near the tobacco showed prominent small ring patterns of the virus type. Aphids are commonly found on these trees.

Black root rot (Thielaviopsis basicola) has been very much in evidence in infected fields where susceptible varieties were grown. Enough seed of a new root rot resistant variety, Burley No. 16, was sold to plant about one-fourth of the Burley crop in Kentucky so that losses from black root rot were not high.

Brown root rot was severe in some fields and caused injury to the roots of plants in many fields where the tobacco had made fair growth. Consequently the tender growth following wet periods wilted and scalded badly in some of these fields.

Frenching was more prevalent than usual in western Kentucky especially along old limestone roads.

Downy mildew in field tobacco a foot tall was reported several times. The spots were large and rapidly became necrotic. Fruting bodies were rare.

Frog eye, and green and black spot on cured tobacco, all caused by Cercospora [nicotianae], were unusually prevalent in Burley tobacco in nearly all parts of the State. Green and black spot are evidently caused by late infections which are probably not evident at cutting time. The green spots probably result when the tobacco is cured under relatively dry conditions and the black spots when curing conditions approach those which induce houseburn.

Fusarium wilt [F. oxysporum nicotianae] was reported more frequently than in the past. Two strains of wilt resistant Burley are being distributed to farmers who have losses from this disease. The dark varieties of tobacco grown in Kentucky are nearly all moderately resistant to wilt.

Scalding caused by excess water was prevalent; perhaps 3 to 5 percent loss in western Kentucky and less in central Kentucky.

In one field in Logan County, a group of stunted plants were dug and examined and all were found to have club root (undet.).

(Kentucky Agricultural Experiment Station).

ONION DISEASE SITUATION IN MASSACHUSETTS SUMMARIZED

O. C. Boyd

The following account of onion disease losses in relation to the unusually wet, hot weather of July, is furnished by Dr. W. G. Colby of the Agronomy Department, who made frequent examinations of the Connecticut Valley crop during the entire growing season. His observations on the development of the non-parasitic blast are of particular importance.

"Blast: Blast first appeared about June 21 on onion seed sets and on seed onions planted on light soil. Since the lightest soil is usually next to the river bank, the blast began along the river banks and spread back toward the higher terraces. Seed sets and seed onions on other light soil areas blasted at this time also. Blast was characterized this year, as usual, by the appearance of small, white spots on the leaves, followed by a dying back from the leaf tips.

"By June 25, virtually all seed sets were badly affected, many fields of seed onions partially affected and some fields of set onions were beginning to die back from the tips. A heavy rain on June 26, 27, and 28, checked the progress of the blast on almost all areas. Ten days of cool weather, following these rains, permitted the set onions to fully mature without appreciable injury and allowed the seed sets in most instances to size up sufficiently to be pulled, even though they had been badly affected by blast. This was particularly true where fertilizer topdressing had been applied to seed sets before the rain. A good crop of seed sets was harvested in almost all instances.

"During the period June 28 to July 8, the seed onions made good top growth and had begun to form bulbs. Even those areas where the blast had made its appearance earlier made good growth. At this time, prospects were excellent for a good crop of seed onions. Of course, small areas on light

land, particularly land flooded in 1936, made little recovery and indicated that they would be a total loss. A period of warmer weather followed from July 8 to July 17 but the progress of blast on seed onions was not rapid. On July 17, however, a maximum temperature of 87° resulted in the rapid spread of blast symptoms in practically all seed onion fields. Between July 18 and July 25, some five inches of rain fell, with only one rainless day. The relative humidity was high at all times, and the few hours of sunshine which occurred during the week seemed to greatly accelerate the spread of the blast. Clear, hot, humid weather on July 25 and 26 followed this rainy week and greatly increased its severity in almost all seed onion fields. Even fields on the higher terraces in the vicinity of Amherst, which seldom show the effects of blast until much later than Valley fields, were seriously affected at this time. In no instance as a result of blast, was either the yield or the quality of a field of seed onion much more than 50 to 60 percent of what could be considered to be a good crop.

"The blast situation is so serious with seed onions that many growers are abandoning seed onions as a crop. Two successive years of very poor seed onion crops have resulted in large financial losses to growers with a consequent reduction in acreage.

"Downy Mildew: Some mildew [Peronospora destructor] was reported July 20 but only in isolated cases and of no wide extent. Set onions had fully matured by this time and, if seed onions were affected, the disease was masked by the rapid spread and severity of blast.

"Bulb Rots: Most of the tops on set onions were broken over and many of them were pulled before the rainy week of July 18-25. Instead of the leaves dying back to the stem, as is usually the case following maturity, the leaves this year as a result of rains rotted into a slimy, wet mass. As a result the stems, even though topped, did not dry down satisfactorily and offered a splendid opportunity for the development of various soft rots. A few bulbs rotted from this trouble soon after pulling and many more did so in storage where proper precautions were not taken to provide dry, well-ventilated storerooms. The best quality onions thus far observed were pulled before the rain, topped while green, and placed in drying crates in the field.

"A so-called 'bottom rot' (probably Fusarium rot) developed some weeks after the set onions were pulled. Growers seemed to feel that the large bulbs were more severely affected than smaller bulbs. Losses were much greater this year from this disease than normally. The abnormally wet weather and the practice of permitting onions to stand out in the field for weeks following pulling, no doubt were important factors in the widespread occurrence of this disease."--W. G. Colby.

Neck Rot: Botrytis neck rot also is appearing generally in storage, in both the seed and set onions. It is most prevalent in seed onions and in sets that were pulled but not topped and stored prior to the prolonged rain during the latter part of July. The disease is largely in the early, moist-decay stage of development with few or no sclerotia yet formed.

Storm Damage: Thousands of bushels of onions still in bags and crates in the fields were badly damaged by the 12-inch rainfall of September 17-21 and by the resulting flood waters of the Connecticut River. Additional losses were caused by the unroofing or outright destruction of scores of storage houses. The water damage will no doubt greatly aggravate the storage-decay problem.

(Massachusetts State College).

PEACH YELLOWS IN TENNESSEE

Reported by the Bureau of Entomology and Plant Quarantine.

During the 1937 inspection season on the Phony Peach Control and Eradication Project several inspectors of the Bureau of Entomology and Plant Quarantine incidentally found in the State of Tennessee trees which they thought to be affected with the peach yellows disease and which were later identified as such by Dr. Lee M. Hutchins. Listed below are the counties and the number of properties in each where this disease was found:

County	Number of Properties
DeKalb	4
Franklin	1
Warren	23

This year in the course of the annual inspections for phony peach, conducted by the Bureau and the Tennessee State Department of Agriculture, the peach yellows disease was found to be distributed over a much wider area in that State and included counties in which the disease was not found last year. The findings during the 1938 inspection season are listed below:

County	Number of Properties
Anderson	1
Blount	2
Franklin	17
Knox	3
Marion	Town of South Pittsburg badly infected
Roane	1
Sullivan	10
Warren	77

COLLETOTRICHUM GRAMINICOLUM ON GRASSES IN MARYLAND AND VIRGINIA

C. L. Lefebvre and H. W. Johnson

Colletotrichum graminicolum (Ces.) Wilson was observed on orchard grass (Dactylis glomerata) in the Division of Forage Crops and Diseases grass nursery at the National Agricultural Research Center, Beltsville, Maryland on July 29, 1938. The fungus was present on all of the strains of orchard grass examined but appeared to be more prevalent on strains recently introduced from Europe. Scolecotrichum graminis Fckl., a common parasite of orchard grass, was also present but seemed to be causing less damage than the Colletotrichum during this season. The anthracnose fungus was causing numerous, small, round or elliptical, reddish-brown spots on the leaves; in some cases the lesions coalescing to form long, necrotic streaks or necrotic bands the full width of the leaf blades. Black acervuli were numerous in the older lesions.

This fungus also appeared to be causing a leafspot on Brachypodium mucronatum Willd. growing in the same grass nursery as the orchard grass. On this host the affected portion of the leaf is bleached resulting in a prominent white lesion with a narrow brown border. On older lesions the black fruting bodies of the fungus can be seen in the center of the white spots. These are first visible beneath the epidermis but later break though the epidermis and develop into typical Colletotrichum acervuli.

C. graminicolum was observed on both Sudan grass (Sorghum vulgare var. sudanense) and orchard grass at Arlington, Virginia on August 3, 1938. Small, reddish-brown, round lesions several millimeters in diameter were abundant on certain Sudan grass selections at this time. Later the small lesions became confluent and killed large areas of the leaf. Fruiting bodies of the fungus were abundant in the mature lesions on these hosts.

(Division of Forage Crops and Diseases, Bureau of Plant Industry).

SEMI-ARID CLIMATE OF VALUE IN SEED PRODUCTION

Howard P. Barss

Paralleling somewhat the experience reported by W. C. Snyder in the October 1 issue of the Reporter (page 367) and illustrating the influence of Pacific Coast semiarid growing season conditions on certain common diseases, I can recall having personally seen an attack of bean anthracnose [Colletotrichum lindemuthianum] in Oregon only once in over 20 years. This was in a Western Oregon backyard garden planted with packeted seed, probably of eastern origin, the remnant of which showed anthracnose lesions. The owner sprinkled the garden regularly with a garden hose.

The stripe disease of barley [Helminthosporium gramineum] is another disease never seen by me in Oregon except in plantings made with seed from sources east of the Rocky Mountains. Because of the difficulty many parasitic fungi have to maintain themselves through the growing season where there is prevailingly low atmospheric humidity, an increasing volume of seed of various types of crops is being produced west of the continental backbone as seedsmen are increasingly taking advantage of these favorable conditions provided by nature.

(Office of Experiment Stations).

A CORRECTION

Dr. John L. Sheldon calls attention to an error in the September 15 issue. On page 357 Puccinia fraseri is reported as having been collected in Shenandoah County, West Virginia. This should read Shenandoah County, Virginia, instead.

PLANT DISEASE FUNGI AND VARIOUS MOLDS ASSOCIATED WITH HUMAN DISEASE

The isolation of Ustilago zeae and Cephalosporium acremonium from skin diseases, and the connection of air-borne spores of Alternaria, Cladosporium, Rhizopus, Aspergillus, Helminthosporium, etc., with various types of allergic diseases, are discussed in articles abstracted in recent issues of the Review of Applied Mycology.

Durham (O. C.). Incidence of air-borne fungus spores. I. Alternaria.--J. Allergy, viii, 5, pp. 480-490, 1 fig., 4 graphs, 1 map, 1937. (R. A. M. Vol. XVII: 243. April, 1938).

Franchi (F.). Lesioni cutanee da Cephalosporium acremonium Corda. (Contributo clinico-sperimentale.) [Cutaneous lesions due to Cephalosporium acremonium. (A clinico-experimental contribution.)]--Dermosifilografo, xii, pp. 301-326, 1937. [Abs. in Zbl. Haut- u. GeschlKr., lviii, 1, p. 69, 1938.] (R. A. M. Vol. XVII: 242. April, 1938).

Harris (L. H.). Molds as a cause of allergy.--Ohio St. med. J., xxxiv, 2, pp. 158-160, 1938. (R. A. M. Vol. XVII: 599. September, 1938).

Preininger (T.). Durch Maisbrand (Ustilago maydis) bedingte Dermatomykose. [Dermatomycosis caused by Maize smut (Ustilago maydis.)]--Arch. Derm. Syph., Berl., clxxvi, 2, pp. 108-113, 3 figs., 1937. (R. A. M. Vol. XVII: 174. March, 1938).

Prince (H. E.) & Morrow (Marie B.). Molds in the etiology of asthma and hay fever with special reference to the coastal areas of Texas. --J. sth. med. Ass., xxx, 7, pp. 754-762, 2 figs., 3 graphs, 1 map, 1937. (R. A. M. Vol. XVII: 243. April, 1938).

Schonwald (P.). Alergenic molds in the Pacific Northwest.--J. Allergy, ix, 2, pp. 175-179, 2 graphs, 2 charts, 1938. (R. A. M. Vol. XVII: 395. June, 1938).

Simon (F. A.). Allergic conjunctivitis due to fungi.--J. Amer. med. Ass., cx, 6, p. 440, 1938. (R. A. M. Vol. XVII: 458. July, 1938).

FLOOD AND HURRICANE DAMAGE TO CROPS IN NEW ENGLAND

A preliminary survey made public yesterday by the Bureau of Agricultural Economics said crop damage in the New England flood and hurricane would run into millions of dollars. A loss of at least $2,000,000 was suffered by the tobacco crops of that area. The quantity loss was placed at 6,000,000 pounds. Some of the tobacco not actually destroyed was damaged and the quality of other parts of the crop was lowered. Onion growers estimated their loss at 300 cars, or approximately 150,000 bushels, out of a total crop forecast of about 1,250,000 bushels. Though most of the onions had been harvested, thousands of bushels remained in the fields in crates and sacks and were either damaged or destroyed. Irish potatoes had been harvested prior to the storm, but rising waters covered and destroyed hundreds of acres of late potatoes in the ground. Yields outside the flood areas were expected to be curtailed materially because of rot caused by the heavy rains. About 4,000,000 bushels of apples, or more than a half of the estimated New England production this year, were blown from trees. Some of these were salvaged, but it was feared most would be lost because they could not be absorbed by the market before rot set in. Very heavy damage was done to fruit trees. About a fourth of the apple trees in the area were damaged, with a loss of about 10 percent in value. Pears and peaches also suffered. (New York Times, quoted in U. S. Department of Agriculture Daily Digest, October 6).

SEPTEMBER WEATHER

(From Weekly Weather and Crop Bulletin for the week ending October 4).

The outstanding feature of the weather for September was the severe storm of tropical origin that passed inland over southern New England on September 21, resulting in heavy loss of life and enormous damage from winds and floods. Rainfall during the month, largely from this storm, was abnormally heavy from eastern North Carolina northward, including all of

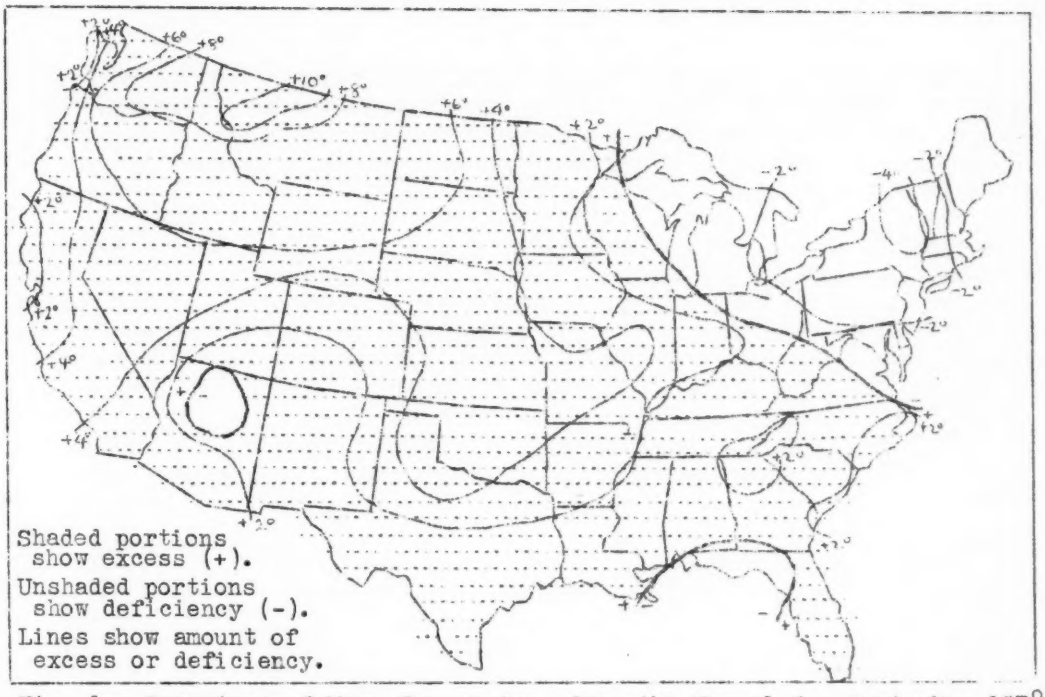

Fig. 1. Departure of Mean Temperature from the Normal for September 1938.

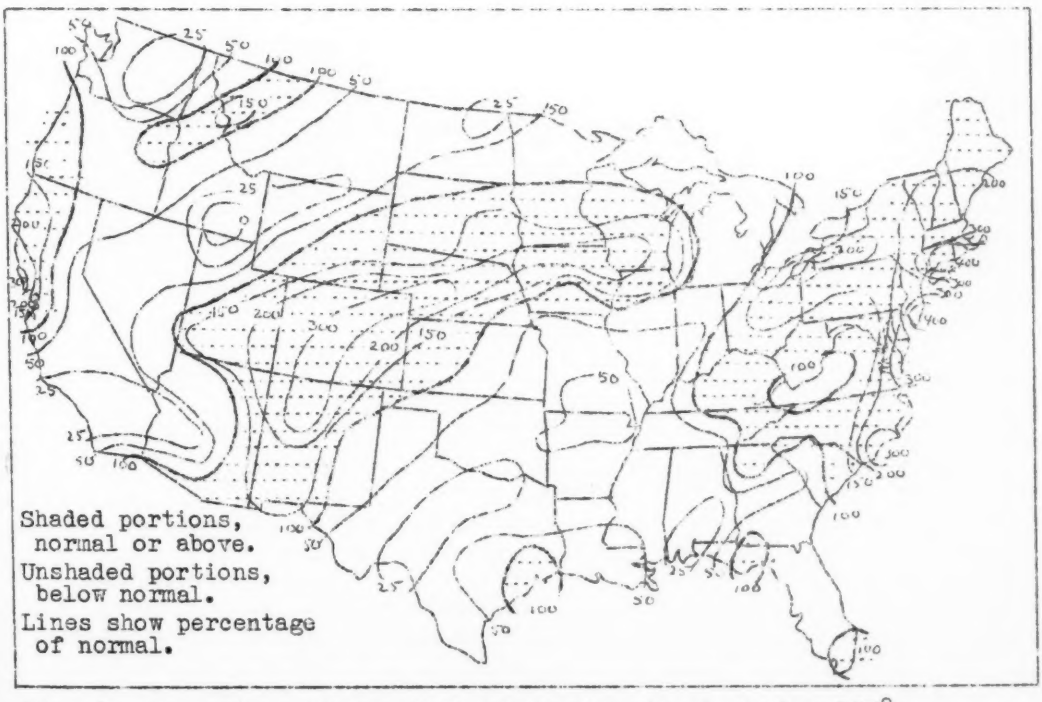

Fig. 2. Percentage of Normal Precipitation for September 1938.

New England and New York. The largest total for the month in New England, as reported from a first-order station, was 14.5 inches at New Haven, Connecticut, although Wilmington, North Carolina, had somewhat more rainfall, 16.3 inches. At New Haven it was the heaviest September fall of record and has been exceeded only once in other months, July 1889, 17.1 inches.

Figure 1 shows that September was warmer than normal in all sections of the country, except the Northeast and a few localities in the South and Southwest. From the lower Missouri Valley and southern Great Plains northwestward the month was from 4° to 11° warmer than normal, while the far Western States had mostly from 3° to 5° plus departures. For the country, as a whole, since the first of the year every month, except May and June, has been warmer than normal. For these 2 months temperatures averaged approximately normal in all sections of the country, but all other months were considerably warmer than normal, February, March, and August being markedly so.

Figure 2 shows that, in addition to the heavy eastern rainfall, precipitation for the month was much greater than normal over a belt extending from Lake Michigan southwestward to Colorado and northern New Mexico, with from two to nearly four times the usual September amounts; Madison, Wisconsin, reporting 10.3 inches and Dubuque, Iowa, 9.1 inches. The middle Pacific coast area also had heavy rains. On the other hand, the month had scanty rainfall in the central and lower Mississippi Valleys, the southern Plains, and much of the far Northwest.